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BULLETIN No. 1.

U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF AGROSTOLOGY.

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NOTES ON

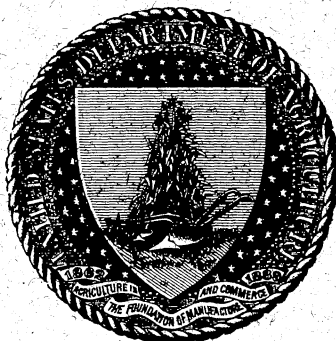
GRASSES AND FORAGE PLANTS

OF THE

SOUTHEASTERN STATES.

BY

THOMAS H. KEARNEY, Jr.,  
ASSISTANT AGROSTOLOGIST.



WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
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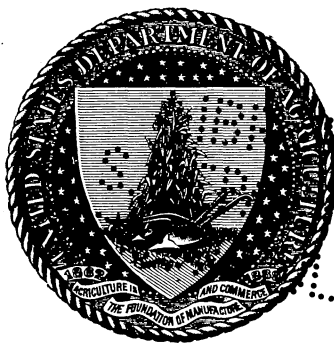
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## LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,  
DIVISION OF AGROSTOLOGY,  
*Washington, D. C., September 19, 1895.*

SIR: I have the honor to transmit herewith for publication some notes on the grasses and forage plants of the Southeastern States, prepared by my assistant, Thomas H. Kearney, jr. These notes are based upon direct observations in the field, made in accordance with a commission from the Secretary of Agriculture under date of June 18, 1895. In accordance with his instructions Mr. Kearney visited Knoxville, Tenn.; Selma and Mobile, Ala.; Tallahassee, Apalachicola, Jacksonville, and St. Augustine, Fla.; Savannah and Augusta, Ga.; Aiken, S. C.; Wilmington, N. C., and Norfolk, Va. He was directed to note all the species of grasses at the several points visited, and to gather all facts obtainable relative to them which might be of scientific or economic interest.

Material assistance in accomplishing this work and much valuable information concerning the grasses and other forage plants of their respective localities was furnished by Dr. Charles Mohr, of Mobile, Ala.; Dr. A. W. Chapman, of Apalachicola, Fla.; Judge R. C. Long, of Tallahassee, Fla., and Capt. W. W. Woolsey, of Aiken, S. C.

The paper here presented is divided into two parts—the first, devoted to forage plants of actual or possible value, the several kinds being enumerated in alphabetical order for more ready reference; the second comprises a list of all the species of Gramineæ collected or seen, arranged according to their natural classification, with observations of purely botanical interest. This arrangement of the matter separates the economic from the scientific portions of the report, which will be appreciated alike by the farmer and the botanist.

Respectfully,

F. LAMSON-SCRIBNER,  
*Agrostologist.*

Hon. J. STERLING MORTON,  
*Secretary of Agriculture.*



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# NOTES ON GRASSES AND FORAGE PLANTS COLLECTED OR OBSERVED IN THE SOUTHEASTERN STATES.

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## PART I.

### ECONOMIC NOTES UPON THE GRASSES AND OTHER FORAGE PLANTS OF THE REGION TRAVERSED.

Very few plants are widely cultivated in the South for hay or pasturage, the farmer relying for the most part upon the wild grasses. These may be roughly divided into two classes—the first comprising introduced grasses, mostly annuals, which spring up on cultivated land after the regular crop has been removed; the second, native grasses, the majority perennials, which make the bulk of the pasturage. Of the first class by far the most important is crab grass (*Panicum sanguinale*), which forms a great part of the volunteer hay crop of the South Atlantic and Gulf States. With it are often associated crow-foot or barn grass (*Eleusine indica*), little crowfoot (*Dactyloctenium aegyptiacum*), pigeon grass (*Setaria glauca*), and, in the far South, spur grass (*Cenchrus echinatus*) and Mexican clover (*Richardsonia scabra*). Of the native, perennial grasses perhaps the most important belong to the genus *Paspalum*, Louisiana grass (*Paspalum platycaule*) being the most common and best known. *Panicum serotinum* is also a valuable pasture grass over extensive areas. The broom sedges (*Andropogon* species), early in the season, make the bulk of the grazing on thin dry soils. Three other widely known forage plants, belonging to neither of these classes, must be mentioned. Johnson grass, dreaded as a weed yet esteemed as a forage plant, is an introduced perennial grass, highly valued for hay. Japan clover (*Lespedeza striata*) is perhaps the most valuable pasture maker, for the largest area, in the Southern States, while both for hay and for grazing “Bermuda” is king among grasses throughout the South.

### ALPHABETICAL LIST OF THE GRASSES AND OTHER PLANTS OF THE SECTIONS VISITED WHICH ARE OR MAY BE OF IMPORTANCE AS FORAGE.

[With economic notes.]

AGROSTIS ALBA VULGARIS. (See Redtop.)

AGROSTIS PERENNANS.—In northern Alabama this grass remains green nearly all winter in damp, sheltered ground, and affords good pasturage.

ALFALFA.—Alfalfa is cultivated with great success near Augusta, Ga.

**ANDROPOGON.**—Several species of *Andropogon*, or broom sedge, of which *A. Virginicus* is the most common, are esteemed for pasturage in the South, as they flourish in very poor soils. In spring, while tender and juicy, they afford a fair amount of nutritious grazing; but as they mature they become dry and hard. At Tallahassee, Fla., they are considered by some as almost, if not quite, the most valuable pasture grasses of Leon County.

**ANTHÆNANTIA VILLOSA.**—This grass is frequent in dry, sterile pine barrens around Jacksonville, Fla., but never grows in great quantity. Otherwise it might be of some value, as the tufts of rather broad, tender root leaves should afford better grazing than most grasses of the pine barrens.



FIG. 1.—Broom sedge (*Andropogon virginicus*).

**ARISTIDA STRICTA**, the "wire grass" which covers large tracts of the pine barrens in the South Atlantic and Gulf States, is said to constitute a large part of the pasturage of the "barrens." It must be eaten when very young, for in July, though still immature, it was quite dry and hard, with rigid, wiry leaves. I have never seen the tufts cropped where cattle were grazing.

**BARN GRASS.** (*See Eleusine indica.*)

**BARNYARD GRASS.** (*See Panicum crus-galli.*)

**BEGGAR WEED.** (*See Desmodium tortuosum.*)

**BERMUDA GRASS** (*Cynodon dactylon*).—Perhaps no one plant represents more of value to the South than does "Bermuda;" certainly no other forage plant is more precious to that section. Whether for hay or for pasturage, it is everywhere placed first, and is considered the most nutritious grass that can be successfully grown in the Southern States. While it requires a fertile soil for its best development, it will grow on the thinnest soil, being a common plant of

seabeaches. In such situations the plants are very small, the erect, flowering stems being quite short, and long, sterile shoots (sometimes 6 feet long), rooting at every joint, are produced. In better land—a light, loamy soil seems to suit it best—the tendency to send out long, creeping shoots is checked, the upward growth is much greater, and the amount of leafage increases correspondingly, the whole plant becoming more tender and succulent. Besides its great value as a forage plant, Bermuda is one of the most effective of soil holders. When growing on sandy river banks and ocean beaches it is, apparently, the most valuable sand-binding grass of the Southern States. It is sometimes planted by road-



FIG. 2.—Bermuda grass (*Cynodon dactylon*).

sides and upon embankments for this purpose, and is a favorite lawn grass in most towns and cities, forming a close, fine turf, and remaining green in the driest and most sun-exposed stations.

**BIG CROWFOOT.** (See *Eleusine indica*.)

**BROMUS UNIOLOIDES.** (See Rescue grass.)

**BROOM SEDGE.** (See *Andropogon*.)

**CENCHRUS ECHINATUS.**—This grass, known as “spur grass” in Florida, is a common weed of cornfields and of cultivated land generally in that State and elsewhere in the far South. When young, before the bur-like coverings of the flowers are developed, it is said to make excellent hay, being tender and nutritious, and pro-

ducing a considerable bulk of forage. But the burs, when mature, make the plant a troublesome weed, though not so formidable as the related sand spur (*C. tribuloides*). Judge R. C. Long, at Tallahassee, places this fourth among the spontaneous hay-making grasses of Leon County, Fla.

**COWPEAS.**—This is the most widely cultivated, in its several varieties, of leguminous plants in the South and highly valued, not only for its excellent forage qualities, but also as a restorer of exhausted soils. As a crop for rotation with corn or other cereals, it is apparently unsurpassed. It is grown almost everywhere in the South Atlantic and Gulf States.

**CRAB GRASS** (*Panicum sanguinale*).—Crab grass is generally considered the best hay grass of the Southern States. It is never cultivated in the ordinary sense, but comes up spontaneously on arable land after the cultivated crop is taken off.



FIG. 3.—Crowfoot (*Eleusine indica*).

Sometimes the ground is lightly rolled, but that is the only preparation made for it. After a crop of corn or cotton, one, or sometimes two, good catches of crab hay are made on the land. On account of its rapid growth crab grass is peculiarly adapted for its functions as an after crop. In good soil, when favored by sufficient rain, it attains considerable size. At Mobile it was seen nearly 4 feet high. It is a tender grass and makes a sweet hay, but is slow to give up its moisture, and therefore rather difficult to cure. When allowed to get the better of the cultivator, it becomes a troublesome weed, but with ordinary care is easily subdued. With it are usually associated, in cultivated land, crowfoot (*Eleusine indica*), little crowfoot (*Dactyloctenium aegyptiacum*), and sometimes Mexican clover (*Richardsonia scabra*) and spur grass (*Cenchrus echinatus*), also sprouting crab grass (*Panicum proliferum*). At Aiken I saw a large lawn, quite a good-looking one, composed almost exclusively of this grass.

CRIMSON CLOVER.—In east Tennessee this clover, if cut young, when the heads are just beginning to flower, yields a hay of excellent quality. I was told at Tallahassee that this is the only clover which will stand the hot, dry summers there.

CROWFOOT. (See *Eleusine* and *Dactyloctenium*.)

CYNODON DACTYLON. (See Bermuda grass.)

CYPERUS ROTUNDUS. (See Nut grass.)

DACTYLOCTENIUM ÆGYPTIACUM, generally known as "little crowfoot," is held in considerable esteem as a hay grass in most parts of the South. Like crab grass, it appears spontaneously in cultivated land, and forms a more or less important element of the crop of grass which springs up after the corn or cotton has been taken off. It is usually considerably smaller than the big crowfoot (*Eleusine indica*), which it much resembles; but sometimes attains a very fair size. At Tallahassee it was observed  $2\frac{1}{2}$  to 3 feet in height.

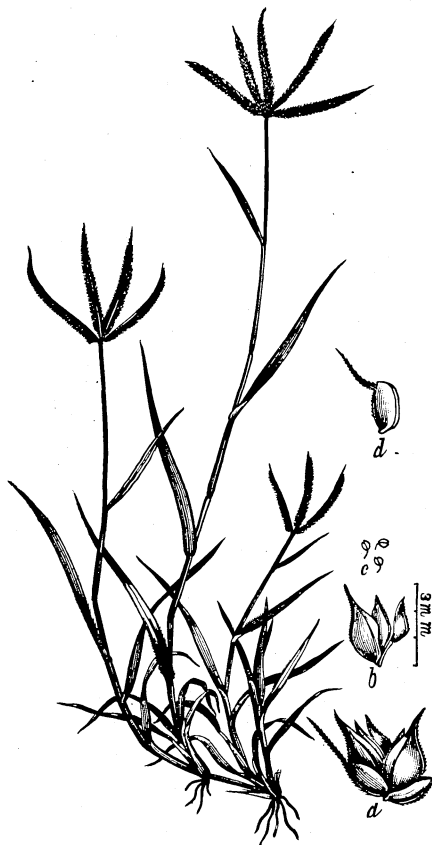


FIG. 4.—Little Crowfoot (*Dactyloctenium aegyptiacum*).

DESMODIUM TORTUOSUM (*D. molle*).—Valued for grazing in Leon County, Fla., where it is known as beggar weed. Other species of *Desmodium* form a part of the native pasturage and hay crop in the South.

ELEUSINE INDICA (crowfoot, big crowfoot, barn grass).—This, with crab grass, makes the great bulk of the "spontaneous" hay crop in most parts of the South. It is much more common than little crowfoot, which it resembles closely in habit, appearance, and quality. It is a larger plant, in fertile soil attaining a considerable height. It seems to do best in somewhat shaded ground. In an orchard

at Mobile I noticed a fine growth of it, averaging 3 to 3½ feet in height. Opinions differ as to its value. It is a rather tough grass, and becomes quite hard when growing in dry soil. I was told by several close observers that cattle will not touch it when grazing; and I noticed at Norfolk that cows browsing along the roadsides refused crowfoot altogether. Yet the general opinion is that, when cut young, it makes excellent hay, though troublesome to cure.

**ERAGROSTIS CONFERTA.**—Dr. Mohr tells me that this grass has some value for forage, being the only species of *Eragrostis* in the Southern States of any economic worth.

**ERIOCHLOA MOLLIS.**—This grass is frequent in the salt marshes of the St. Johns River near Jacksonville, Fla. It is a coarse, stout grass, usually 4 or 5 feet high, and would not produce a great bulk of forage, yet is probably the best grass that will grow in brackish soil thereabouts, and might be useful as a constituent of salt-marsh hay. It does not grow in great quantity in any one place and would be hard for cattle to reach, as it makes its home along ditches and among bushes on the edges of the marshes, or with the rushes and cord grass that cover the marshes themselves. It might be worth cultivating in brackish meadows where better grasses could not be grown successfully. I did not learn that it had been tested as to its nutritive qualities, nor do I know of any English name for it.

**GERMAN MILLET, OR HUNGARIAN GRASS** (*Setaria italica germanica*).—Does well at Apalachicola and makes excellent fodder. A good field of it was seen at Savannah. Largely cultivated about Augusta, Ga. Seems to be well adapted to the soil and climate of the Gulf and South Atlantic States, and is much esteemed as fodder for horses.

**HOLCUS LANATUS** (meadow soft grass, velvet grass).—Abundantly naturalized along railways in western North Carolina and east Tennessee, and is frequent by roadsides near Norfolk, Va., preferring moist ground. I have seen it nowhere grazed by cattle.

**HUNGARIAN GRASS.** (See German millet.)

**INDIAN CORN.**—Nothing that is new can be said about this, which is beyond question the most important fodder plant of the Southern States.

**ITALIAN RYE GRASS** (*Lolium italicum*).—Judge R. C. Long, at Tallahassee, says he has had fair success with this grass.

**JAPAN CLOVER** (*Lespedeza striata*).—For pasturage Japan clover, or, as it is more often called, *Lespedeza*, is probably the most important plant of the Southern States, if the extent of the area over which it occurs in important quantities be considered. It is rarely sown, but grows without cultivation, and soon covers the most sterile soils. On poor soil it is fit only for grazing, but in moist, fertile ground it becomes large enough to cut for hay. Cattle are said to prefer it to any other plant, except, perhaps, Bermuda, whether for pasturage or fodder. It is less common immediately along the coast than in the great interior region of the South, where it has made itself at home almost everywhere. It does best where there is some lime in the soil, yet it will grow well where lime is nearly or quite absent. At Aiken, S. C., it was growing abundantly in the pine woods. Capt. W. W. Woolsey, at Aiken, told me that if *Lespedeza* hay be put in the rack with other kinds cattle invariably eat the *Lespedeza* first. Mr. Dibble, who has a large dairy farm near Aiken, is sowing a large part of his land with *Lespedeza*. At Knoxville, Tenn., it is claimed that this *Lespedeza* drives out broom sedge.

**JOHNSON GRASS** (*Sorghum halepense*).—Doubtless the most widely cultivated perennial hay grass in the South. In the bulk of forage produced it surpasses any plant commonly cut for hay in that section. Like most large, coarse grasses, it must be cut when quite young, as the stems and leaves afterwards become hard and dry. Its great drawback is the difficulty of eradicating it when it once

takes hold of a piece of land. Many valuable plantations in Alabama and Mississippi have been almost ruined by the hold Johnson grass has obtained on the land. It is said to be eradicable by close grazing for several successive seasons. The best Johnson grass observed was near Selma, Ala., not far from where it is said to have been originally introduced (near Montgomery). Here it is abundant and grows taller and larger than anywhere else. In the low country along the Gulf and Atlantic Coast I found but little of it, and that comparatively poor. Again, at Augusta, Ga., and at Aiken, S. C., I found it very good. It is evidently best adapted to the central portions of the Southeastern States.

**KAFFIR CORN** (*Sorghum vulgare* var.)—Cultivated at Aiken, S. C., with success. On a large dairy farm near Aiken it is cut for ensilage, being mixed with Indian corn.

**KENTUCKY BLUE GRASS** (*Poa pratensis*).—Mr. Matthews, who has charge of the Government grass garden at Knoxville, tells me that *Sisymbrium thaliana*, a small weed belonging to the hedge mustards, nearly crowded out the plot of Kentucky blue grass in early spring. Kentucky blue grass is said to do well in shaded soil at Tallahassee, but it is probably not well adapted to withstand the long, hot summers of the Gulf States.

**LESPEDEZA STRIATA.** (See Japan clover.)

**LITTLE CROWFOOT.** (See *Dactyloctenium aegyptiacum*.)

**LOUISIANA GRASS.** (See *Paspalum platycaule*.)

**MAIDEN CANE.**—This name is sometimes applied to *Panicum digitarioides*, a tall, branched grass with long, creeping rootstocks and rather broad leaves, found chiefly in ditches in the low country along the coast from North Carolina to Texas. It is of some value for forage, but it is not sufficiently abundant to be of much importance; and, as it usually grows in ditches, it is not easy for cattle to get at. If cut when young its hay would probably compare favorably with most native grasses of the South. Small plants often grow in considerable patches on railway embankments near Jacksonville, and by their strong, long, creeping rootstocks make excellent soil binders. The name maiden cane seems to be applied to other species of *Panicum*, probably to *P. scabriusculum* and *P. viscidum*. The former is a smooth grass growing in swamps and around ponds, mostly in the pine barrens, and having about the same range as *P. digitarioides*, which it much resembles. It is readily distinguished, however, by its "head," which is an open panicle, instead of a long, thin, narrow spike as in *P. digitarioides*. It is of about equal value. *Panicum viscidum* is a very common grass in the Southern States, inhabiting ditches, swamps, and borders of ponds. It is much like *P. scabriusculum*, but is downy all over. When old it is much branched, the long stems reclining on the ground or on other plants. It makes a considerable bulk of very sweet hay, and is said to be much relished by horses and cattle. It is probably one of the most valuable native grasses of the South.

**MEXICAN CLOVER.** (See *Richardsonia scabra*.)

**MILLO MAIZE** (*Sorghum vulgare* var.)—Both white and yellow millo maize yield very profitable crops at Aiken, S. C. On a farm near that place a single acre of the white variety is reported to have yielded in one season 35 tons of ensilage, two cuttings having been made.

**MISSION GRASS.** (See *Stenotaphrum americanum*.)

**MÜHLENBERGIA DIFFUSA** (Nimble Will).—Dr. C. Mohr tells me that in northern Alabama, in the valley of the Tennessee, this is considered an excellent pasture grass for shaded grounds.

**NIMBLE WILL.** (See *Muhlenbergia diffusa*.)

**NUT GRASS** (*Cyperus rotundus*).—This plant, perhaps the most pernicious weed of the Southern States, is said to have some value besides that of its tubers as food for hogs. According to Capt. W. W. Woolsey, of Aiken, S. C., horses eat it readily.

- OATS.**—Oats do well in river bottoms at Apalachicola, and make good winter feed.  
Oats are successfully cultivated at Aiken, S. C.
- ORCHARD GRASS** does excellently well at Tallahassee, Fla.
- PANICUM AGROSTOIDES.**—This is one of the chief constituents of the hay cut in the Mobile River bottoms.
- PANICUM ANCEPS** occurs along ditches, usually in small quantity and among other plants. Where cattle can get at it they appear to relish it, but it is not abundant enough nor productive enough to be of importance.
- PANICUM ANGUSTIFOLIUM.**—A meadow examined at Mobile was almost covered with this grass in the drier parts. I was told that cattle are fond of it. It is a common plant in woods in the middle and low country, forming, doubtless, an important element of the woodland pasturage.
- PANICUM CLANDESTINUM.**—Found at Mobile, occurring along fences in low meadows. Said to make good forage when young.
- PANICUM COLONUM.**—This is a tender, succulent grass, and is considered good forage in the South. It is a low plant, but makes a considerable bulk of stem and leaf. I saw it only in ditches in the cities and towns, and it is not likely that it is anywhere abundant enough to afford more than an occasional bite. I doubt if it would flourish in any but moist, alluvial soil. It might be grown to advantage in good bottom land.
- PANICUM COMMUTATUM.**—Found usually in fertile woods, and is probably of some importance for woodland grazing.
- PANICUM CRUS-GALLI** (Barnyard grass).—This is occasionally met with as a weed along railways and in waste ground. It is a rank, succulent grass, making a considerable bulk of forage. The hay is probably of fair quality, though rather difficult to cure. Resembles *P. colonum*, though much larger, and might be valuable in a similar soil.
- PANICUM CRUS-GALLI HISPIDUM.**—This is a tall, coarse grass, covered with rough hair, growing in marshes. It often stools at the base, forming tufts of considerable size, and is therefore very productive. The stems, though large, are full of water and comparatively tender. Seen at Tallahassee and also at Apalachicola, where it was reported that horses relish it greatly. Mr. Lewis, a farmer at Apalachicola, considers it one of the best grasses for horses if kept cut close.
- PANICUM DICHOTOMUM.**—Grows in similar situations as *P. commutatum* and is of equal value. In the South it is found mostly in the upper districts.
- PANICUM DIGITARIOIDES.** (See Maiden cane.)
- PANICUM FUSCUM.**—Introduced at St. Augustine, where it grows in the streets. Produces a considerable bulk of stems and leaves and may have some value as a forage plant. Is large enough to cut for hay, but is rather harsh when cured.
- PANICUM MELICARIUM.**—Grows in wet, open ground and is common in the middle and low country. Though a small grass, producing no considerable bulk of forage, it usually grows in considerable quantity and makes quite an important element of the natural pasturage. It is tender and juicy, making a fine, sweet hay. I was told at Mobile that it is much relished by cattle.
- PANICUM PAUCIFLORUM.**—This is a woodland grass, mostly of the middle country. I found it abundant at Augusta and Aiken. It is doubtless of some little value as an element of the woodland pasturage.
- PANICUM PROLIFERUM GENICULATUM.** (See Water grass.)
- PANICUM REPENS.**—Grows along the shores of Mobile Bay. It is a tough, rather rigid grass, but I have noticed it cropped by cattle, so it may have some value among the scanty pasturage of seabeaches. It is a good sand binder.
- PANICUM SCABRIUSCULUM.** (See Maiden cane.)
- PANICUM SEROTINUM.**—This common grass of the coast region of the South disputes with Louisiana grass the honor of being the most valuable native pasture grass of that section. It is probably a biennial, sending out leafy, creeping shoots that root at every joint. It is much like crab grass, but smaller in every way,



with shorter leaves and of a lighter green color. It is too low to be valuable except for grazing, though it makes a fine, sweet hay, much like crab hay, but of finer quality. It is invaluable for pasturage, forming a close turf and driving out almost all other plants. It grows in sandy soil, preferring a little moisture, but growing well without it. At Apalachicola, I found the bulk of the pasturage composed of *Panicum serotinum*. I know no popular name for it. "Little crab grass" would be appropriate.

**PANICUM VISCIDUM.** (See Maiden cane.)

**PANICUM WALTERI.**—A plant of fertile woods, much more common in the middle and upper country than near the coast. Resembles *P. commutatum*, but is every way larger. What is said of the latter as a forage plant would apply to this.

**PASPALUM CILIATIFOLIUM.**—Grows usually in rather fertile soil, preferring shade. May possess some little value, although I have never observed it being eaten by cattle grazing in fields where it grows. It is common everywhere in the South.

**PASPALUM DILATATUM.**—Not uncommon in the South. Is usually met with along ditches, growing in large tufts. Although rather coarse, it makes abundant hay of good quality. Dr. C. Mohr thinks it one of the best of the Paspalums.

**PASPALUM DISTICHUM.**—A common plant of ditches, borders of ponds, and river banks. It is a tender, succulent grass, sending up abundant leafy shoots; but, as it rarely grows in any quantity where it can be got at easily, is not of much importance. A variety growing on the Gulf shore sends out long creeping shoots which root at each joint, making the plant an effective sand binder. At Apalachicola I noticed that cattle cropped the upright stems of this variety, but left the creeping ones.

**PASPALUM FURCATUM.**—This species is much like Louisiana grass in appearance and habit of growth, but is larger in every way. It grows in moist soil, often along pine-barren streams, or along ditches by roadsides. From the root are sent out short leafy shoots, which creep along the ground and root at the joints, making a close turf. I have seen it only in small quantities, but it should make excellent pasturage, being juicy and tender. It is said to be much esteemed on the prairies at Opelousas, La., where cattle fatten upon it rapidly. It is valueless for hay, the leaves being mostly near the ground and the stems almost naked and wiry. It is a plant of the low pine-barren region.

**PASPALUM LEVE.**—A common species in the South, growing in fields and meadows and along roadsides. Has some value as an element of the native pasturage, but soon becomes tough and wiry.

**PASPALUM MEMBRANACEUM.**—Noticed at Mobile and at Jacksonville in moist, sandy soil along railway tracks. It is a small grass, but is very tender and succulent, and ought to make excellent pasturage where it grows in sufficient quantity. As it is a perennial, with creeping rootstocks, it should be valuable in permanent meadows where there is sufficient moisture. For that purpose it might be mixed with Louisiana grass or with *Panicum serotinum*, if able to hold its own with them.

**PASPALUM PLATYCAULE** (Louisiana grass).—This grass is highly prized in the low country, though apparently not generally known as "Louisiana grass." It prefers moist, sandy, open ground, in such situations forming a close, tender turf. Dr. Mohr says that it shoots up with the first warm days of spring and affords grazing nearly all the year around. It is much like *Paspalum furcatum*, but is considerably smaller. It is abundant where it grows, and is probably the most valuable native pasture grass of that region. At Mobile I saw a large pasture, belonging to a dairyman, covered almost exclusively with Louisiana grass supporting a dozen or so of cows in fine condition. At Savannah I saw it larger and better than at any other point.

**PASPALUM PLICATULUM.**—Grows in tufts in dry, sandy, open ground in the pine barrens. I saw it from Mobile to Savannah. It is said to furnish fairly good

grazing when young, but soon becomes dry and the stems wiry. However, it is probably a better grass than most of those of the dry pine barrens. I saw it growing in dry soil on the banks of an artificial lake at Mobile, where the short, strong rootstocks made excellent soil binders.

**PASPALUM PRÆCOX.**—This species grows along ditches and streams and about ponds in the pine barrens. It is an erect grass with but little leafage, but is doubtless relished by cattle ranging the pine barrens, for when young it is quite tender and juicy.



FIG. 5.—Louisiana grass (*Paspalum platycaule*).

**PASPALUM PURPURASCENS.**—Grows in moist ground, preferring a rather heavy soil.

I found it abundant in the middle and low country, and am convinced that it is one of the best hay grasses of the South. It grows in tufts and usually occurs in considerable quantities, crowding out most other grasses. It reaches a height of 4 feet or so, is perfectly smooth, very tender, and so sappy that the hands are wet in breaking a single stalk. It makes a good bulk of very sweet hay, although rather slow in drying. It is readily recognized by the red-purple color assumed by the leaves and stems toward the base. I found it common from Mobile to Wilmington along the coast and as far back as Augusta.

**PEARL MILLET.**—I noticed a small quantity of this cultivated at Jacksonville, but not doing well, perhaps on account of the dryness of the soil where it was grown.

**POA ARACHNIFERA.** (See Texas blue grass.)

**POA COMPRESSA** (Wire grass, English blue grass).—In the Government grass garden at Knoxville is a plot of this and Bermuda in mixture, forming an extremely dense turf. This mixture had endured for several years, neither grass having obtained a decided advantage over the other. Mr. Matthews, in charge of the garden, tells me that in spring and early summer, before the Bermuda begins to grow, the blue grass gets a good growth, and again in the fall when the growth of the Bermuda has ceased, so that one grass or the other would afford grazing throughout the season. In view of this, and of the ability of both grasses to withstand drought, this may prove a valuable mixture for the South. But it is doubtful whether the English blue grass will grow to advantage much farther South. The blue grass may ultimately conquer the Bermuda, as its rootstocks penetrate much deeper into the soil. Dr. Mohr says *Poa compressa* is spreading rapidly in northern Alabama and is proving very valuable. He thinks it would finally drive out Bermuda if planted with it.

**POA PRATENSIS.** (See Kentucky blue grass.)

**RED CLOVER.**—Said to do well at Tallahassee. It is successfully grown at Augusta, Ga.

**REDTOP** (*Agrostis alba vulgaris*).—This grass is not uncommon in moist ground along railways and about wharves in the Gulf States, often growing vigorously in such places. I see no reason why it could not be grown successfully in the low country if given a moist, rather heavy soil. I am inclined to think that redbtop could be cultivated to better advantage in that section than timothy, orchard grass, or the other staple hay grasses of the North.

**RESCUE GRASS** (*Bromus unioloides*).—Dr. C. Mohr considers this a valuable grass in southern Alabama. Judge R. C. Long says it does fairly well at Tallahassee.

**RICE.**—Rice is grown by Mr. Lewis at Apalachicola for horse feed, for which he thinks it about as valuable as corn.

**RICHARDSONIA SCABRA** (Mexican clover).—This plant often appears in cultivated land after the crop has been taken off, and is usually associated with crab grass. I saw it nowhere large enough to make good hay. Opinions differ as to its worth. Dr. C. Mohr thinks it of some value. Judge R. C. Long, of Tallahassee, does not esteem it and keeps it out of his land. A gentleman who resides near Thomasville, Ala., described a succulent plant of sandy bottoms under the name of "water pusley," which I think must be the Richardsonia. He says it is very palatable to cattle and is excellent for green manuring.

**SEA OATS.** (See *Uniola paniculata*.)

**SETARIA CORRUGATA.**—Occurs in cultivated land near the coast and is sometimes an important element of the spontaneous hay crop. It is not productive enough to be of much importance.

**SETARIA GLAUCA** (Pigeon grass, yellow foxtail).—What has been said of *Setaria corrugata* will apply to this species also, though *S. glauca* is more productive.

**SETARIA GLAUCA LEVIGATA.**—This variety is found chiefly along the coast, although I noticed it at one point in the interior (at Augusta, Ga.). At Mobile I saw it in moist but not brackish ground, making a heavy growth and promising a large bulk of hay. It seems to be much more productive than common pigeon grass, and might be valuable for river bottoms. It grows in both fresh-water and brackish swamps.

**SETARIA ITALICA GERMANICA.** (See German millet.)

**SIDA SPINOSA.**—Judge R. C. Long informs me that this plant, though now abundant at Tallahassee, is a recent introduction there; says it is admirable for restoring exhausted top soils, as the roots extend deep into the subsoil, and that it makes very good winter grazing for cattle.

**SMUT GRASS.** (See *Sporobolus indicus*.)

**SORGHUM HALEPENSE.** (See Johnson grass.)

**SORGHUM VULGARE.** (See Kaffir corn and Millo maize.)

**SPOROBOLUS INDICUS** (Smut grass).—This grass, everywhere naturalized in fields and waste ground in the South, is much esteemed for pasturage, especially for horses. As it grows in tufts, sending out no shoots, it does not make a close turf. Capt. W. W. Woolsey, of Aiken, objects to it on this account. It is said to be highly nutritive. It will grow in very poor soil, but requires fertile land for its best development, under such conditions producing a considerable quantity of forage. Judge R. C. Long, of Tallahassee, thinks so highly of smut grass that he intends to plant a large area of land with it exclusively.



FIG. 6.—St. Augustine grass (*Stenotaphrum americanum*).

**SPOROBOLUS VIRGINICUS**.—This is a small grass growing on beaches along the coast. Its slender, creeping rootstocks, sending up tufts of stems at intervals, make it an excellent sand binder. The foliage is tender and may possess some value for seaside pasturage.

**SPUR GRASS.** (See *Cenchrus echinatus*.)

**STENOTAPHRUM AMERICANUM** (St. Augustine grass, Mission grass).—The lawn of Judge R. C. Long, at Tallahassee, is composed almost entirely of this grass, and I saw several other lawns at the same place composed solely of mission grass. I saw it also planted along the streets in Savannah. It makes a dense turf when kept close cut, and has a fresh, green color when growing in good soil. It is as well adapted to resist drought as Bermuda, and certainly makes a brighter, prettier lawn than that grass does. Judge Long says that with its

long, creeping shoots rooting at the joints it drives out all other grasses, even Bermuda, but is easily eradicated itself by plowing under. At St. Augustine, where it grows about the old Spanish fort, Bermuda grass was getting the better of it. Judge Long plants the grass as Bermuda is usually planted—by plowing with a hand plow, and placing short pieces of the stems in the furrows, and covering lightly with soil. It is a tender, succulent grass, in good soil making a considerable quantity of forage, and is said to be excellent for sheep pastures. It owes its name “mission grass” to its occurrence about the old missions in Florida and other States, where it was doubtless introduced by the Spaniards.

**SWEET POTATO.**—Capt. W. W. Woolsey, of Aiken, considers sweet potatoes excellent for horses, feeding about a peck each day with half rations of corn or oats. The vines he dries on racks and feeds as hay.

**TEXAS BLUE GRASS** (*Poa arachnifera*).—Judge R. C. Long stated that this grass flourishes in the stiff red-clay soil of Leon County, Fla., but does not thrive in thin sandy soils. Capt. W. W. Woolsey, at Aiken, has had good success with this grass, which affords excellent grazing late in winter and in spring. On his lawn it grows with Bermuda, neither grass seeming to crowd out the other. It took him about three years to get a good stand of it.

**TRIPSACUM DACTYLOIDES.**—A farmer at Apalachicola told me that this makes good fodder for horses if cut when young.

**UNIOLA PANICULATA** (Sea oats).—Grows in the sand of seabeaches, a little way above high tide. It is an excellent sand binder, its rootstocks being very strong and penetrating deep into the soil, much like those of marram grass, of which it is the Southern analogue. On St. Georges Island, off Apalachicola, Fla., I noticed the leaves cropped by cattle, but it is too tough and dry to be of any importance as a forage plant.

**WATER GRASS** (*Panicum proliferum geniculatum*).—This is a common grass of moist ground in the low country, found usually in alluvial river bottoms. It is a large, succulent grass, a rank grower, sometimes 7 feet high, the stout stems rooting at the lower joints. It produces a large bulk of stem and leaves, and is perhaps the most important native hay grass for bottom lands in the South. Is known and highly valued almost everywhere in that section. A physician of Thomasville, Ala., considers this, next to crab grass, the best forage plant of that part of the country.

**WIRE GRASS.** (*See Aristida stricta.*)

## PART II.

### LIST OF GRASSES COLLECTED OR OBSERVED IN THE SOUTHEASTERN STATES FROM JUNE TO AUGUST, 1895.

#### MAYDEÆ.

*Tripsacum dactyloides* L.—Selma and Mobile, Ala.; Apalachicola, Fla.; Aiken, S. C.; Wilmington, N. C., in swales, along ditches, in graveyards, etc.

#### ANDROPOGONEÆ.

*Elionurus tripsacoides* HBK.—St. Georges Island, Fla., in dry pine barrens, growing in tufts among bushes. Culms slender, strict, 3 or 4 feet high, in tufts from short rootstocks. The roots have the delightful odor of vitivert (*Andropogon squarrosus*).

*Andropogon argyraeus* Schult.—Aiken, S. C., in dry soil along railway.

*Andropogon argyraeus macra* Scribn.—Jacksonville, Fla., dry, open ground in the pine barrens. Culms tall (nearly 6 feet), slender, little branched; whole plant glaucous. Very different in appearance from *A. argyraeus*. It is A. H. Curtiss's, No. 4952 (1894).

*Andropogon Elliottii* Chapm.—St. Georges Island, Fla., in dry pine barrens.

*Andropogon provincialis* Lam.—Aiken, S. C., in dry soil, hilly pine woods.

*Andropogon scoparius* Michx.—Hiwassee Gorge, Polk County, Tenn., in dry, sterile soil. Not in flower.

*Andropogon Sorghum Halepense* Brot.—Selma, Ala.; Augusta, Ga.; Aiken, S. C., in fields, at roadsides, etc.

#### PANICEÆ.

*Paspalum ciliatifolium* Michx.—Selma, Ala.; Tallahassee, Apalachicola, and Jacksonville, Fla.; Savannah, Ga.; Wilmington, N. C., fields, roadsides, etc. The ordinary form, found usually in rather fertile, shaded ground, is almost perfectly smooth, except the ciliate margins of the leaves. A very hairy form, growing in dry, sterile soil, observed at Mobile, Tallahassee, and Savannah, is probably *P. dasyphyllum* Ell.

*Paspalum difforme* Le Conte.—Mobile, Ala.; Jacksonville, Fla., in rather fertile soil along railway tracks. Resembles *P. floridanum glabratum*, but smaller in every respect.

*Paspalum dilatatum* Poir.—Mobile, Ala.; Augusta, Ga., in moist ground along ditches.

*Paspalum distichum* L.—Knoxville, Tenn.; Mobile, Ala.; Apalachicola and Jacksonville, Fla.; Wilmington, N. C., in ditches, about ponds, river banks, and ocean beaches. On the beach at Apalachicola I found sterile shoots 6 feet or more in length, making excellent sand binders. A small form (*P. vaginatum* Sw.?), found in moist soil on the beach at Apalachicola, lacked the characteristic bluish color of the species.

*Paspalum floridanum* Michx.—Selma and Mobile, Ala.; Jacksonville, Fla.; Savannah and Augusta, Ga.; Aiken, S. C.; Wilmington, N. C., in moist or dry, open ground. Varies considerably in degree of pubescence.

*Paspalum floridanum glabratum* Engelm.—Mobile, Ala.; Jacksonville, Fla., moist, open ground, usually along railways, less frequent than *P. floridanum*, flowering at the same time. Very conspicuous for its blue-glaucous color, which extends even to the spikelets. Is probably a distinct species.

- Paspalum furcatum* Flugge.—Jacksonville, Fla.; Savannah, Ga.; Wilmington, N. C. moist, open ground along ditches and streams in the pine barrens.
- Paspalum leve* Michx.—Selma, Ala.; Tallahassee and Jacksonville, Fla.; Savannah, Ga.; Aiken, S. C.; Wilmington, N. C.; Norfolk, Va., fields, roadsides, moist meadows, etc. Varies from very hairy to quite smooth, and in the size of the spikelets. A form collected at Jacksonville, very smooth, with several spikes, seems to approach *P. purpurascens*.
- Paspalum membranaceum* Walt.—Mobile, Ala.; Jacksonville, Fla., moist, sandy soil, along railway tracks; not common.
- Paspalum platycaule* Poir.—Selma and Mobile, Ala.; Tallahassee and Jacksonville, Fla.; Savannah, Ga., moist, sandy soil in low meadows, roadsides, etc., usually very abundant.
- Paspalum plicatulum* Michx.—Mobile, Ala.; Jacksonville, Fla.; Savannah, Ga., very dry open ground in the pine barrens. Resembles *P. leve*, but is more rigid.
- Paspalum praecox* Walt.—Mobile, Ala.; Jacksonville, Fla.; Savannah, Ga.; Wilmington, N. C., about ponds and along ditches and streams in the pine barrens, in moist ground. Varies in degree of pubescence. Seems to flower "off and on" all summer.
- Paspalum purpurascens* Ell.—Mobile, Ala.; Jacksonville, Fla.; Savannah and Augusta, Ga.; Denmark, S. C.; Wilmington, N. C., in low meadows and along streams, in moist, rather heavy soil; common.
- Paspalum setaceum* Michx.—Mobile, Ala.; Tallahassee and Jacksonville, Fla.; Savannah and Augusta, Ga.; Wilmington, N. C., in dry, sandy soil at roadsides and in fields; common in the pine barrens. Very distinct from *P. ciliatifolium*.
- Paspalum virgatum pubiflorum* Vasey.—Mobile, Ala., along a ditch in the city; introduced. Lower sheaths rough hirsute.
- Anthrenantia villosa* Benth.—Jacksonville, Fla., dry, sandy soil in pine barrens; frequent.
- Amphicarpum floridanum* Chapm.—Jacksonville, Fla., especially abundant upon railway embankments, also at roadsides and in cultivated fields, in rather loose, dry soil. Grows often in large patches, the slender, branched, creeping root-stocks making it an excellent soil binder.
- Eriochloa mollis* Kunth.—Jacksonville, Fla., brackish marshes of St Johns River. Sometimes over 5 feet high.
- Panicum amarum minus* Vasey and Scribn.—Norfolk, Va., ocean beaches, in drifting sands, just above high tide. Great majority of plants small and sterile. Root-stocks not penetrating deep, but much branched, making excellent sand binders.
- Panicum anceps* Michx.—Tallahassee and Jacksonville, Fla.; Savannah, Ga.; Wilmington, N. C., along ditches, usually in shaded ground. Plant collected at Wilmington is the large, nearly smooth, northern form, with larger spikelets. The others belong to the small-flowered southern form (*P. anceps pubescens* Vasey), with the lower sheaths pubescent or villous, whole plant often becoming purplish when growing in dry, open ground.
- Panicum angustifolium* Ell.—Mobile, Ala.; Augusta, Ga.; Aiken, S. C.; Wilmington, N. C. Two well-marked forms: one small, compact, much branched, growing in dry, open ground; the other larger, more straggling, less branched, darker green, preferring moist ground in the pine barrens.
- Panicum autumnale* Bosc.—Selma, Ala.; Augusta, Ga.; Aiken, S. C., dry, sandy soil, fields and roadsides, abundant at Augusta and Aiken. Leaves glaucous. Callus at base of panicle branches very prominent at period of flowering, glistening when held to the light, as if full of water.
- Panicum baldwinii* Nutt. in Herb. Phila. Acad. (*Panicum nitidum minor* Vasey Contr. U. S. Nat. Herb. 3: No. 1, 30, 1892).—Carrabelle and Jacksonville, Fla.; Savannah, Ga.; Wilmington, N. C., in fertile pine woods, or in moist, open ground.

- Varies greatly in size, degree of branching, length of leaf, etc. The Wilmington plant, growing in low, wet, open ground, is minutely pubescent.
- Panicum barbulatum* Michx.—Polk County, Tenn.; Tallahassee, Fla.; Savannah and Augusta, Ga.; Wilmington, N. C., in moist, fertile, shaded ground along streams. At Savannah specimens were collected of a *Panicum* with the habit, panicle, and spikelets of *P. barbulatum*, but smooth at the nodes.
- Panicum ciliatum* Ell.—Mobile, Ala.; Apalachicola and Jacksonville, Fla.; Wilmington, N. C., dry soil in pine barrens. Is certainly a distinct species.
- Panicum clandestinum* L.—Knoxville, and in Polk County, Tenn.; Mobile, Ala.; Wilmington, N. C., low fertile ground in thickets along streams.
- Panicum colonum* L.—Mobile, Ala.; Tallahassee, Fla., in ditches in the stree
- Panicum commutatum* Schult.—Knoxville, and in Polk County, Tenn.; Tallahassee and Jacksonville, Fla.; Augusta, Ga.; Norfolk, Va., in fertile woods. Varies much in size, length and breadth of leaves, etc.
- Panicum crus-galli* L.—Mobile, Ala., moist ground along railway.
- Panicum crus-galli hispidum* Torr.—Tallahassee and Apalachicola, Fla., in open swamps. Nearly 6 feet high at Tallahassee. Certainly native. Panicle lighter colored than in *P. crus-galli*.
- Panicum demissum* Trin.—Jacksonville, Fla.; Savannah, Ga., fertile open soil in pine barrens. It is No. 4029, A. H. Curtiss (1893).
- Panicum dichotomum* L.—Knoxville, and in Polk County, Tenn.; Aiken, S. C.; Norfolk, Va., in dry, fertile woods. Typical *P. dichotomum* seems to be scarce or altogether wanting in the low country.
- Panicum digitarioides* Carpenter.—Jacksonville, Fla.; Wilmington, N. C., in ditches and swamps. Ordinarily quite smooth. Small, sterile plants sometimes straggle into dry, open ground, especially upon railway embankments, and, with their branching rootstocks, make excellent soil binders. In such situations the plants are quite hairy. At Jacksonville these small plants often grow in large patches with *Amphicarpum floridanum*, which they somewhat resemble. The slender, spike-like, greenish panicles stand out at an angle to the axis of the culm.
- Panicum filiforme* L.—St. Georges Island, Fla.; Augusta, Ga., in dry soil. The southern form is larger, less strict, and more leafy at base than the northern.
- Panicum fuscum* Sw.—St. Augustine, Fla., sidewalks and vacant lots near the beach. Grows in tufts of considerable size, the culms reclining and rooting at the joints toward the base.
- Panicum gibbum* Ell.—Mobile, Ala.; Apalachicola and Jacksonville, Fla.; Augusta, Ga., in moist ground, in thickets and fence rows, and along ditches and streams. The weak culms recline on the ground unless supported by other objects.
- Panicum lanuginosum* Ell.—Polk County, Tenn.; Aiken, S. C.; Wilmington, N. C.; Norfolk, Va., in dry, open woods, apparently more common in the middle and upper country.
- Panicum laxiflorum* Lam.—Tallahassee and Jacksonville, Fla.; Augusta, Ga., fertile, wooded hillsides or low woods. The southern form is smaller and narrower leaved than the northern.
- Panicum longipedunculatum* Scribn.—Wilmington, N. C., in pine barrens, preferring rather moist soil.
- Panicum melicarium* Michx.—Selma and Mobile, Ala.; Jacksonville, Fla.; Savannah and Augusta, Ga.; Aiken, S. C., wet, sandy, open ground; common.
- Panicum nodiflorum* Lam. (?)—Mobile, Ala.; Wilmington, N. C.; Norfolk, Va., low meadows. Culms in tufts, sometimes 2 feet high, becoming much branched (not dichotomously), purplish; sheaths ciliate at throat and along edges with long, lax hairs, plant otherwise smooth (in Wilmington specimens leaves also ciliate); primary panicle small, many-flowered; secondary axillary panicles numerous, barely exserted, few-flowered; spikelets one-half line long, obovate,



- often becoming dark purple; empty glumes minutely pubescent. I think this must be a good species. It is represented in the National Herbarium by specimens from several localities, all in the coast region. It seems to be nearest *P. barbulatum*, but can hardly be referred to that species.
- Panicum pauciflorum* Ell.—Augusta, Ga.; Aiken, S. C., dry soil in pine barrens.
- Panicum proliferum* Lam.—Augusta, Ga., low ground at roadside.
- Panicum pubescens* Lam.—Mobile, Ala.; Augusta, Ga.; Aiken, S. C.; Wilmington, N. C., dry, barren woods. Varies somewhat in size of spikelets.
- Panicum ramulosum* Michx.—Jacksonville, Fla.; Aiken, S. C.; Wilmington, N. C., sphagnum swamps. It is No. 500 of Nash's Florida collection. The Jacksonville plant has stouter and more rigid culms than the common form. The same form was collected by S. M. Tracy on Horn Island, Mississippi.
- Panicum ramulosum* Michx.—Mobile, Ala.; Apalachicola and Carrabelle, Fla.; Wilmington, N. C., moist or dry soil in pine barrens, a smaller, more erect form, with culms less leafy toward summit, corresponding to *P. ensifolium* Baldw.
- Panicum repens* L.—Mobile, Ala., about wharves in the city and shores of Mobile Bay at least as far as Dog River (10 miles below Mobile).
- Panicum sanguinale* L.—At all points visited, in cultivated ground, roadsides, etc.
- Panicum sanguinale ciliare* Retz.—Carrabelle, Fla., along railway. Small specimens.
- Panicum scabriusculum* Ell.—Mobile, Ala.; Wilmington, N. C., in pine barren swamps. I have never seen this species producing the lateral autumnal panicles so abundant in *P. viscidum*.
- Panicum serotinum* Trin.—Mobile, Ala.; Tallahassee, Apalachicola, and Jacksonville, Fla.; Savannah, Ga.; Wilmington, N. C., dry or moist sandy soil. Dr. Charles Mohr has never been able to determine whether this plant is annual or perennial. Its delicate, fibrous roots, having but a slight hold on the soil, seem to belong to an annual, while its creeping stems and early appearance in spring point to its being perennial. It is not improbably a biennial.
- Panicum sphærocarpum* Ell.—Selma and Mobile Ala.; Jacksonville, Fla.; Savannah and Augusta, Ga.; Aiken, S. C.; Wilmington, N. C.; Norfolk, Va., in woods and on banks in dry, usually fertile, soil. Quite variable in size and habit.
- Panicum stenodes* Griseb.—Mobile, Ala.; Jacksonville, Fla., in wet pine barrens; scarce at Mobile, common about Jacksonville.
- Panicum virgatum* L.—Mobile, Ala.; Jacksonville, Fla.; Wilmington, N. C.; Norfolk, Va., usually growing in dry soil, but near streams or ditches. At Wilmington, in moist pine-barrens, a slender, reduced form with few-flowered panicles was collected.
- Panicum viscidum* Ell.—Selma and Mobile, Ala.; Jacksonville, Fla.; Savannah, Ga.; Wilmington, N. C.; Norfolk, Va., in swamps and along ditches; very common.
- Panicum walteri* Poir.—Knoxville, and in Polk County, Tenn.; Tallahassee, Fla.; Savannah, Ga., in fertile woods. All specimens collected had bearded nodes.
- Setaria corrugata* Schult.—Apalachicola, Jacksonville, and St. Augustine, Fla., in cultivated fields and waste ground. Grows in tufts, often of considerable size. The St. Augustine plant has the corrugations of the flowering glume less prominent.
- Setaria glauca* Beauv.—Mobile, Ala.; Savannah and Augusta, Ga.; Norfolk, Va., cultivated ground and roadsides.
- Setaria glauca levigata* Chapm.—Mobile, Ala.; Apalachicola, Fla.; Augusta, Ga., in moist ground along ditches beside railway tracks; at Apalachicola in salt marshes along the coast. This, I think, is almost certainly a native grass and is, in all probability, a distinct species. It is easily recognized by its flattish culms, very glaucous leaves, and shorter spikes, with longer bristles than those of *S. glauca*. The rootstocks are short, knotted, horizontal, somewhat reminding one of those of *Muhlenbergia Mexicana*.
- Setaria imberbis* R. & S.—Mobile, Ala., about wharves; introduced from South America.

- Cenchrus echinatus* L.—Tallahassee and Jacksonville, Fla., in cultivated fields; at Jacksonville common in waste ground in the city.
- Cenchrus incertus* M. A. Curtis.—Mobile, Ala.; Augusta, Ga., in dry, sandy soil; at Augusta in cornfields.
- Cenchrus tribuloides* L.—Tallahassee, Carrabelle, Apalachicola, and Anastasia Island Fla.; Wilmington, N. C., in dry, sandy soil, seabeaches, roadsides, etc. Contains at least two varieties or possibly species. One (collected at Wilmington) has rather few, large involucre with stout spines. The other (collected at Tallahassee and Apalachicola) is a more slender plant, with more numerous, smaller involucre with slender, straw-colored spines. On Anastasia Island was collected a form of the large-flowered variety with long, straggling culms that support themselves on the bushes.
- Stenotaphrum americanum* Schrank.—St. Augustine, Fla., along Marine street and about the old fort. Probably originally planted there. Saw a number of seedlings growing out of the coquina walls of the fort itself.

## ORYZÆ.

- Hydrochloa Caroliniensis* Beauv.—Mobile, Ala.; Augusta, Ga., in clear, usually running water, most frequent in the pine barrens. Abundant about Mobile. Not seen in flower. The slender culms are often 2 feet or more in length, rooting at the lower nodes. In shallow water the summits of the culms appear above the surface, while in deeper water the uppermost leaves float upon the surface. Leaf blades dull green above, purplish beneath.
- Zizaniopsis miliacea* Doell & Asch.—Mobile, Ala.; Apalachicola, Fla.; Wilmington, N. C., in swamps and ditches, preferring alluvial mud. Sterile shoots erect, flowering ones strongly geniculate, rooting at the joints.
- Zizania aquatica* L.—Wilmington, N. C.; Suffolk and Norfolk, Va., in marshes near the sea.
- Leersia hexandra* Sw.—Mobile, Ala.; Tallahassee and Jacksonville, Fla.; Wilmington, N. C., swamps, ditches, and borders of ponds. Much taller in Mobile River swamps, where it grew among *Spartina polystachya*, than I have seen it elsewhere. There, and at Wilmington, the spikelets were largely affected with an ergot-like disease. Specimens collected at Tallahassee have very large flowers. Spikelets reddish brown, turning a dull brown purple.
- Leersia oryzoides* Sw.—Norfolk, Va., in bogs.

## AGROSTIDÆ.

- Aristida gracilis* Ell.—Jacksonville, Fla., upon a railway embankment. A large form, same as No. 4043, A. H. Curtiss (1893).
- Aristida purpurascens minor* Vasey.—Apalachicola and Jacksonville, Fla., dry, sandy soil, in the open.
- Aristida spiciformis* Ell.—Apalachicola, Fla., in moist pine barrens.
- Aristida stricta* Michx.—Apalachicola, Fla.; Aiken, S. C.; Wilmington, N. C., dry pine barrens; abundant almost everywhere in the low country.
- Stipa avenacea* L.—Wilmington, N. C., in dry pine barrens. Still in flower August 3.
- Stipa Neesiana* Trin.—Mobile, Ala., about wharves; introduced from South America.
- Muhlenbergia capillaris trichopodes* Vasey.—Jacksonville, Fla., in dry soil, but always near ditches. The panicle has a whitish color.
- Muhlenbergia Mexicana* Trin.—Knoxville, Tenn., banks of Tennessee River; not yet in flower.
- Phleum pratense* L.—Polk County, Tenn.; Selma and Mobile, Ala.; Apalachicola, Fla.; Norfolk, Va., along railways and roadsides. At Mobile and Apalachicola a small form grew among driftwood on the beach.
- Sporobolus curtissii* Small (*Sporobolus floridanus curtissii* Vasey, in herb.).—Jacksonville, Fla., in pine barrens, growing in open ground along railways. A much

smaller, narrower-leaved, and in every way more delicate plant than *S. floridanus*. It grows in similar situations, but is much more common about Jacksonville. It is A. H. Curtiss's Nos. 4053, 5181.

*Sporobolus floridanus* Chapm.—Apalachicola and Jacksonville, Fla., rather moist ground in pine barrens. Grows in strong tufts, the dried sheaths at base of culms becoming hard and polished.

*Sporobolus indicus* R. Br.—Selma and Mobile, Ala.; Tallahassee, Apalachicola, and Jacksonville, Fla.; Savannah and Augusta, Ga.; Aiken, S. C.; Wilmington, N. C., fields, roadsides, and along streets in the cities; almost everywhere in the South. Varies much in size and in the shape of the panicle, which is sometimes very narrow and spike-like, sometimes more open, with longer branches. Usually affected with smut.

*Sporobolus juncus* Kunth.—Jacksonville, Fla.; Aiken, S. C.; Wilmington, N. C., in dry pine barrens. In flower at Wilmington August 3.

*Sporobolus virginicus* Kunth.—St. Georges Island, Florida, on the beach, with *Paspalum distichum*. The slender, rather deep-seated rootstocks send up tufts of culms at intervals. As is usually the case with grasses with creeping rootstocks, a majority of the plants are sterile.

*Agrostis alba vulgaris* Thurb.—Polk County, Tenn.; Selma, Ala.; Jacksonville, Fla.; Savannah, Ga.; Norfolk, Va., along railway tracks, at roadsides, and about wharves. The form collected at Selma, Jacksonville, and Savannah is slender, very glaucous, with numerous sterile shoots, and grows in moist soil. In Polk County, Tenn., besides the ordinary "redtop," a slender, strict form, about 1 foot high, with small panicles, was collected along the Marietta and North Georgia Railroad in the Hiwassee Gorge.

*Agrostis alba* L. var.—Hiwassee Gorge, Polk County, Tenn., in wet ground. A large, succulent form, with stout geniculate culms and large panicles.

*Agrostis scabra* Willd.—Polk County, Tenn.; Augusta, Ga.; Aiken, S. C.; Wilmington, N. C., in fields and roadsides.

*Cinna arundinacea* L.—Norfolk, Va., in marshes.

*Ammophila arenaria* Link.—Elizabeth River Beach, near Norfolk, Va., just above high tide. Grows in large patches, with here and there a fertile plant. Smaller here than farther north.

#### AVENEÆ.

*Holcus lanatus* L.—Asheville, N. C.; Polk County, Tenn.; Norfolk, Va., moist ground, roadsides, and along railway tracks.

*Trisetum palustre* Torr.—Hiwassee Gorge, Polk County, Tenn., on a wet rock—a single specimen.

*Avena sativa* L.—Hiwassee Gorge, Polk County, Tenn., adventitious along railway.

*Danthonia sericea* Nutt.—Mobile, Ala.; Aiken, S. C., dry pine barrens; past flowering.

*Danthonia spicata* Beauv.—Knoxville, Tenn.; Polk County, Tenn., dry soil, woods and fields.

#### CHLORIDEÆ.

*Cynodon dactylon* Pers.—At every point visited, except Polk County, Tenn. On the beach at Apalachicola occurs a reduced form, with small leaves and short flowering culms and spikes, which produces sterile shoots sometimes 7 feet long, making an admirable sand binder. Along the railway track opposite Augusta I found the large form 3 feet high.

*Spartina densiflora* Brongn.—Apalachicola and St. Georges Island, Fla., in the sea marshes, with *S. juncea*. Resembles *Ammophila* in habit and in the spike-like panicle, which is often purplish. Culms sometimes nearly 5 feet high. Rootstock penetrates deep into the sand, rooting at intervals, like that of *Ammophila*.

*Spartina juncea* Ell.—Mobile, Ala.; Apalachicola, St. Georges Island, and Jacksonville, Fla.; Norfolk, Va., in brackish marshes and on seabeaches. The southern form is much larger than the ordinary form of the New England and Middle States. When growing on beaches it sends out stolons, often 3 feet long, with purplish, polished scales. It takes firm hold of the sand and is excellent for binding it.

*Spartina polystachya* Ell.—Mobile, Ala.; Apalachicola, Fla.; Savannah, Ga.; Wilmington, N. C.; Suffolk and Norfolk, Va., in brackish marshes.



FIG. 7.—Toothache grass (*Ctenium americanum*).

*Ctenium americanum* Spreng.—Mobile, Ala.; Apalachicola and Jacksonville, Fla.; Wilmington, N. C.; low, wet pine barrens. The bud of next season on the rootstock is snugly protected by the scaly bases of old leaf sheaths that clothe the base of the culm. The spikes, while young, stand out at right angles to the culm; but as they mature they become more or less curled. Occasionally a second smaller spike occurs, attached at the same point. This might be considered a vestige of the digitate inflorescence of other *Chlorideæ*. The leaves are quite glaucous beneath. When young, *Ctenium* has not much odor, but as the plants grow older, especially when exposed to the sun, the whole plant exhales a fragrance not unlike that of *Melissa officinalis*. I did not find the rootstock very pungent to the taste at this season.

*Chloris glauca* Vasey.—Jacksonville, Fla., in dry soil along a ditch near St. Johns River. This and the next species are probably biennial, the tufts of leaves at

the roots remaining green after the rest of the plant has become dry. The small fibrous roots can hardly belong to a perennial. The culms are strongly geniculate, sometimes 4 feet high. It is a very handsome plant.

*Chloris Swartziana* Doell.—Apalachicola and St. Augustine, Fla., dry, sandy soil.

*Gymnopogon brevifolius* Trin.—Jacksonville, Fla., in moist, open ground.

*Gymnopogon racemosus* Beauv.—Aiken, S. C., fertile, wooded hillside.

*Eleusine indica* Gaertn.—At every point visited. In the streets of Savannah specimens with viviparous spikelets were collected. The spikelets were metamorphosed into tiny branches with well developed leaves, showing a perfect definition of sheath and blade.

*Dactyloctenium aegyptiacum* Willd.—Selma, Ala.; Tallahassee, Fla.; Savannah, Ga.; Aiken, S. C., roadsides and cultivated ground. Along the sidewalks at Savannah a small form, with short and comparatively thick spikes, was collected.

*Leptochloa mucronata* Kunth.—Mobile, Ala., in cultivated ground.

#### FESTUCEÆ.

*Phragmites communis* Trin.—Mobile, Ala., in swamps of Mobile River. Not yet in flower (July 7).

*Triodia ambigua* Vasey.—Mobile, Ala.; Jacksonville, Fla., along ditches, in open ground, in the pine barrens. Grows in tufts; leaves glaucous.

*Triodia cuprea* Jacq.—Augusta, Ga., fertile soil along railway.

*Triplasis americana* Beauv.—Aiken, S. C., sterile, sandy soil, in the open.

*Triplasis purpurea* Beauv.—Carrabelle and Apalachicola, Fla.; Norfolk, Va., sea-beaches.

*Eragrostis bahiensis* Schult.—Mobile, Ala., about wharves; introduced from South America.

*Eragrostis brownei* Nees (?).—Tallahassee, Fla., along railway tracks. A handsome little plant, with bunches of bright-green radical leaves and small brown-purple panicles spreading out upon the ground. It is Nash's No. 1611.

*Eragrostis ciliaris* Link.—Apalachicola, Fla., in Dr. Chapman's garden.

*Eragrostis major* Host.—Norfolk, Va., roadsides.

*Eragrostis nitida* Chapm.—Savannah, Ga., along railway track.

*Eragrostis pectinacea* Steud.—Augusta, Ga.; Norfolk, Va., dry, sandy fields.

*Eragrostis pilosa* Beauv.—Mobile, Ala.; Tallahassee, Fla.; Augusta, Ga.; Aiken, S. C.; Norfolk, Va., roadsides and waste ground.

*Eragrostis plumosa* Link.—Carrabelle and Apalachicola, Fla., gardens and waste ground.

*Eragrostis purshii* Schrad.—Selma, Ala., along railway in moist ground.

*Eragrostis refracta* Scribn.—Tallahassee, Apalachicola, and Jacksonville, Fla.; Augusta, Ga.; Aiken, S. C.; Wilmington, N. C., in moist or dry, sandy soil, fields and roadsides.

*Eragrostis sporoboloides* Smith (*Poa hirsuta* Michx).—Selma, Ala.; Augusta, Ga.; Aiken, S. C.; Norfolk, Va., dry, sandy soil, usually in cultivated fields. Panicles sometimes 3 feet long. A perfectly distinct species.

*Eatonia dudleyi* Vasey.—Knoxville, and in Polk County, Tenn., dry, fertile, wooded hillsides.

*Uniola gracilis* Michx.—Mobile, Ala.; Tallahassee and Jacksonville, Fla.; Savannah, Ga.; Wilmington, N. C.; Norfolk, Va., usually in low, moist woods.

*Uniola latifolia* Michx.—Knoxville, Tenn., in rich soil, bluffs of Tennessee River. Not in flower.

*Uniola longifolia* Scribn.—Mobile, Ala., dry, fertile woods, summit of a low hill. Grew with *Uniola gracilis* and appeared very distinct. Is larger and coarser, more erect, and has a duller green color, while the hairy sheaths distinguish it at once.

*Uniola paniculata* L.—St. Georges Island, Florida, on the outer beach, between an undergrowth of sabal, etc., and tide mark; in large patches, most of the plants sterile. Takes the place on the coast of the Southern States of *Ammophila arenaria*, which it resembles in habit of growth, especially of the underground parts.

*Distichlis maritima* Raf.—Apalachicola, Fla., in salt marshes along the coast. Not in flower.

*Poa compressa* L.—Polk County, Tenn.; Norfolk, Va., dry soil, roadsides, etc.

*Poa pratensis* L.—Augusta, Ga.; Aiken, S. C., shaded ground at roadsides.

*Festuca elatior pratensis* Hack.—Norfolk, Va., roadsides.

*Festuca Myurus* L.—Norfolk, Va., roadsides.

*Festuca nutans* Willd.—Hiwassee Gorge, Polk County, Tenn., shaded ground.

*Bromus ciliatus purgans* A. Gray.—Knoxville, Tenn., fertile soil, wooded bluffs, on Tennessee River.

*Bromus secalinus* L.—Polk County, Tenn., along railway track.

*Bromus unioloides* HBK.—Mobile, Ala., about wharves; small specimens.

#### HORDEÆ.

*Elymus canadensis* L.—Hiwassee Gorge, Polk County, Tenn., on a shaded ledge of rock.

*Elymus virginicus* L.—Augusta, Ga.; Aiken, S. C.; Norfolk, Va., along streams and ditches and in swamps.

#### BAMBUSEÆ.

*Arundinaria macrosperma* Michx.—Selma and Mobile, Ala.; Augusta, Ga.; Aiken, S. C., forming "canebrakes" on river banks and in swamps.

*Arundinaria tecta* Muhl.—Mobile, Ala., rich, moist soil, border of a pine-barren pool.